ORIGINAL ARTICLE

Vaccination Coverage in Immunosuppressed Patients

Results of a Regional Health Services Research Study

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SUMMARY

Background: Patients with chronic inflammatory diseases are at elevated risk of infections that can be prevented by vaccination. This elevated risk is due not just to these patients' primary illnesses, but also to the immunosuppressive treatment that they often receive. We studied the vaccination rate in a random sample of patients with two types of inflammatory bowel disease (IBD), namely, Crohn's disease and ulcerative colitis. In particular, we asked unvaccinated patients why they had refused the vaccine.

Methods: From April to September 2009, we gave a 38-item questionnaire to 203 consecutive patients with IBD (57% with Crohn's disease, 63% female, median age 36 years) who had not received vaccination counseling for at least one year, and inspected the patients' vaccination cards. We compared the findings to the current recommendations of the German Federal Standing Committee on Vaccination (Ständige Impfkommission).

Results: 83% of the patients had a vaccination card. Substantial deficiencies in vaccination were found. Only 67% of the patients had been immunized against tetanus in the previous 10 years, and only 21% against pertussis. Only 28% were vaccinated against seasonal influenza in 2008, and only 9% had ever received antipneumococcal vaccine. A subgroup analysis in which we compared 39 patients taking TNF-blockers to 67 patients who never had any type of immunosuppressive treatment revealed no difference in vaccination rates. 80% of all patients said they were willing to receive all of the officially recommended vaccinations. 22% of all patients said they avoided vaccinations for fear of side effects, while 15% said they did so because their immune system was supposedly "not intact", and 9% because they feared vaccination would worsen their IBD.

Conclusion: In this random sample, the vaccination rate fell far behind the recommendations. In particular, there was a marked discrepancy between patients' willingness to be vaccinated and the actual provision of vaccination. These findings imply that physicians need to be more aware of the possibly inadequate vaccination state of their immunosuppressed patients.

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The treatment concepts for patients with chronic inflammatory bowel disease (IBD), which is subdivided into Crohn's disease (CD) and ulcerative colitis (UC), have changed markedly in recent decades. Currently, many patients are started early on long-term treatment with classic immunosuppressive agents or anti-TNF-alpha antibodies (TNF-blockers). TNF-blockers have also been approved for a wide range of rheumatological and dermatological indications and are now the best-selling single preparations in Germany (1, 2). The "classic" immune suppressants azathioprine and methotrexate are being used more commonly as well: in 2009, the overall expenditures for these two drugs in Germany were higher than in 2008 by 4% and 10%, respectively (1). These figures imply that an increasing number of patients are being treated with potent immune suppressants.

Impaired defenses against infection are both a potential sequela of a chronic inflammatory disease and a potential side effect of immunosuppressive treatment (3, 4). There have been reports of infections that could have been prevented by vaccination, including infection with the hepatitis B virus, the human papilloma virus, the varicella-zoster virus, and the influenza virus, among patients with IBD being treated with either the "classic" immune suppressants or TNF-blockers (5–8). In the case of pneumococcal infection, the intensity of immunosuppressive treatment appears to be associated with the severity of infection, which ranges to the life-threatening Waterhouse-Friderichsen syndrome (9–12).

A IBD patient's risk of developing an infectious disease is elevated even in the absence of immunosuppresive treatment. A recent study showed that IBD patients are 57% more likely to develop herpes zoster than normal controls, with an absolute risk of 0.89% per year, as determined from data on more than 22 000 patients (13). Consensus papers have, therefore, been issued both by the European Crohn's and Colitis Organisation and by the German Society of Digestive and Metabolic Diseases *(Deutsche Gesellschaft für Verdauungs- und Stoffwechselkrankheiten)* recommending the determination of vaccination status in IBD patients, followed by the administration of all vaccinations that have not been given or are not up to date, if applicable.

The authors, however, have gained the impression from everyday clinical practice that IBD patients often have a

TABLE 1

Recommended vaccinations for adult patients with chronic inflammatory diseases*

Vaccination	Recommendation of the STIKO** (as of July 2010)	Recommendation of the SIKO*** (as of 1 January 2011)
Tetanus/diphtheria	Booster every 10 yr., catch-up vaccination(s) as needed[1]	Booster every 10 yr., catch-up vaccination(s) as needed[1]
Poliomyelitis	Catch-up vaccination(s) as needed[2]	Booster every 10 yr., catch-up vaccination(s) as needed[1]
Pertussis	The next due Td vaccination should be given once as a Tdap or Tdap-IPV combined vaccination[3]	Booster every 10 yr., catch-up vaccination(s) as needed[3, 4]
Hepatitis A	In hepatic involvement: vaccination as directed by the manufacturer, preliminary serological testing based on epidemiologic and historical considerations[5, 6]	Vaccination as directed by the manufacturer, preliminary serological testing based on epidemiologic and historical considerations[6]
Hepatitis B	In hepatic involvement: vaccination as directed by the manufacturer after serological testing[5, 6,7]	Vaccination as directed by the manufacturer after serological testing [6,7]
Influenza	Annually	Annually
Pneumococci	Single vaccination with 23-valent polysaccharide vaccine[8]	Vaccination with 23-valent polysaccharide vaccine, booster 6 years later
Measles	Single vaccination for unvaccinated patients born after 1970, patients vaccinated only once in childhood, and patients whose vaccination status is unclear[9, 10]	For susceptible patients: 2 vaccinations at least 4 weeks apart, or else a single vaccination and demonstration of immunity[9, 10, 11]
Mumps	No recommendation to vaccinate	For susceptible patients: 2 vaccinations at least 4 weeks apart, or else a single vaccination and demonstration of immunity[9, 10, 12]
Rubella	For women who were never vaccinated or whose vaccination status is unclear, or who were vacinnated once and are of childbearing age: 2 vaccinations or single vaccination[9,10]	For susceptible patients: 2 vaccinations at least 4 weeks apart, or else a single vaccination and demonstration of immunity[9, 10, 13]
Varicella	For seronegative patients before the initiation of immunosuppressive treatment: 2 vaccinations at least 6 weeks apart[9]	For seronegative patients, whether or not immunosuppressive therapy is planned: 2 vaccinations at least 6 weeks apart[9]
Herpes zoster	No recommendation to vaccinate (yet?)	Patients over age 50[9]
Additional recommendations (of both STIKO and SIKO) for patients taking immunosuppressive medication		
Meningococci	Single vaccination with tetravalent conjugate vaccine[14]	
Haemophilus influenzae type b (Hib)	Single vaccination[14]	

* Not including vaccinations that are indicated for occupational reasons, travel vaccinations, or vaccinations that are medically indicated for reasons other than chronic inflammatory disease.
** Standing Committee on Vaccination of the Robert Koch Institute; *** Vaccination Committee of the State of Saxony: in accordance with § 20 Para. 3 of the German Law on Protection against Infectious Disease, the SIKO makes expert recommendations based on those of the STIKO, considering the particular epidemiologic and historical characteristics of the State of Saxony;
[1] catch-up vaccination(s) if baseline immunization is incomplete or absent; [2] catch-up vaccination(s) if baseline immunization is incomplete or absent, or if a recommended single booster has not been given after complete baseline immunization; [3] a vaccine against pertussis alone is not currently available; [4] catch-up vaccination(s) if baseline immunization is incomplete or absent, or if a booster has not been given: one vaccination with Tdap or a Tdap-IPV combined vaccine; [5] chronic inflammatory disease alone is not considered a medical imdication ; [6] a combined HAV/HBV vaccine can be used as indicated
[7] Immunity (anti-HBs) must be tested 4–8 weeks after completion of baseline immunization, and repeated vaccination(s) should be administered as necessary; [8] consider repeating vaccination in 5 years in patients with congenital or acquired immune system defects with residual T- and/or B-cell function, or with chronic renal disease or nephrotic syndrome;
[9] Live vaccine: contraindicated in patients with functionally relevant immunosuppression, should not be given from 14 days before immunosuppressive treatment is initiated until 3 months after it has been terminated (or one month after the termination of high-dose cortisone therapy); [10] MMR vaccine is preferred; [11] susceptible persons are unvaccinated persons born after 1958 without immunological evidence of a prior measles infection; [12] susceptible persons are persons born after 1970 who have never had the mumps or been vaccinated against it, or who lack immunological proof of immunity; [13] susceptible persons are those who were never vaccinated or lack proof of immunity; [14] in analogy to antipneumococcal vaccine; cf. the article (in German) „Hinweise für Patienten mit Immundefizienz" [Information for Patients with Immune Deficiency], *Epidemiologisches Bulletin des Robert-Koch-Institutes,* 10 November 2005.

deficient vaccination status. The purpose of this exploratory study is to assess the vaccination status of IBD patients and, in particular, to determine what reservations, if any, the patients had against the vaccinations recommended by the The German Standing Vaccination Committee (*Ständige Impfkommission,* STIKO) *(Table 1)*. We present our findings here and suggest that they may be relevant to patients with other types of chronic inflammatory disease as well.

Methods

We asked 203 consecutive patients with IBD to bring all of the vaccination documents that they possessed to their next outpatient appointment. The documents were copied, and the data in them were electronically entered into an anonymous database, as were the patients' responses to a questionnaire containing 38 questions (*eSupplement,* available in German). The disease-specific data that were obtained included the duration of disease, all operations that were performed to treat IBD, and a precise and detailed medication history, particularly with respect to immune suppressants. Patients who had been counselled about vaccinations by a doctor within the past year were not included in the study, in order to avoid distortion of the data through varying degrees of prior patient education.

The study began in all three of the participating institutions on 1 April 2009. We decided to terminate it on 30 September 2009, because of concern that the initial media reports of a possible "swine flu" pandemic might alter patients' perceptions of their own vaccination status and thereby skew the findings of the study.

Findings concerning the categorical variables were expressed as frequencies (in percent). The statistical analysis was performed with the chi-squared test. If the predicted cell frequency was less than 5, Fisher's exact test was used. Groups were compared with the Mann-Whitney U test. P-values below 0.05 were considered statistically significant.

Results

Patient characteristics

The patients' median age was 36 years (interquartile ranks [IQR, i.e., 25th and 75th percentiles], 26 and 47 years). 127 (63 %) of the 203 participants were female. 116 (57%) had Crohn's disease (CD), 84 (41%) had ulcerative colitis (UC), and 3 (2%) had a IBD of undetermined type. The median duration of illness was 7 years (IQR 2 years / 12 years), while the maximum duration of illnes was 34 years. 180 patients were being treated by gastroenterologists in private practice and 23 in the outpatient clinic of a university hospital. 52 (25.6%) had undergone at least one operation related to their IBD, while 162 (80%) already required 20 mg or more of prednisolone daily. Their remaining medications are summarized in *Table 2* . In the remainder of this article, we will refer to azathioprine, 6-mercaptopurine, cyclosporine, and methotrexate as the "classic" immune suppressants.

Most of the study participants had spent their childhood up to age 10 in the State of Saxony (136 patients) or another state of the former East Germany (49 patients). Nearly all of the participants currently resided in Saxony (182 patients) or another eastern German state (18 patients). 40% of them had completed secondary education at least up to university-entrance level, 46% had finished 10th grade, and the remaining 14% had terminated their schooling earlier.

Documentation of vaccination and assessment of vaccination status

168 (83%) of the patients were able to produce a vaccination certificate. Most of the remaining 35 patients felt sure that they possessed such a certificate but could not find it even after an extensive search (sometimes in their parents' house as well). 54% of the patients felt sure that they were completely vaccinated, 23% thought they were incompletely vaccinated, and the rest were unsure whether they were adequately vaccinated or not.

125 patients (62%) asked their family doctor to check their vaccination status, 34 (17%) checked their vaccination status themselves, and 15 (7%) asked their gastroenterologist. Four patients asked their occupational health physician, two asked a physician in the government health department, and one each asked a gynecologist and a rheumatologist (some sought information from multiple sources). 44 (22%) never checked their vaccination status and could not remember that it had ever been checked.

TABLE 2

Current and prior medications of the study participants

	Currently taken		Taken earlier		Never taken	
	Number	%	Number	%	Number	%
Prednisolone	54	26.6	118	58.1	1	0.5
Budesonide	23	11.3	58	28.6	88	43.3
Azathioprine	73	36.0	62	30.5	53	26.1
6-Mercaptopurine	5	2.5	6	3.0	158	77.8
Cyclosporine	0	0	6	3.0	161	79.3
Methotrexate	5	2.5	4	2.0	156	76.8
TNF-blocker	27	13.3	12	5.9	134	66.0
Mesalazine	106	52.2	77	37.9	12	5.9
E. coli Nissle	12	5.9	29	14.3	125	61.6

Patients' willingness to be vaccinated and their reasons for not being vaccinated

163 patients (80.3%) responded "yes" to the question, "Would you be willing to have all of the officially recommended vaccinations?" The authors also gave the patients a list of potential arguments against vaccination and asked them to state which of these arguments applied in their case (Table 3). 22.2 % agreed with at least one of these arguments. Four patients said they would be willing to have all of the officially recommended vaccinations but also stated that they were afraid of side effects.

The patients also had the opportunity to write down any other reasons they had not to be vaccinated. Nine patients did so, stating that they avoided vaccinations because vaccinations are ineffective (1), questionably effective (2), or possibly unnecessary (1), or because they forgot to be vaccinated (1), have no time for it (1), prefer alternative medicine (1), are reckless with their health (1), or fear developing yet another autoimmune disease (1). 108 patients (53.2%) agreed with none of the proffered arguments and supplied no others of their own.

Evaluation of vaccination certificates

Evaluation of the vaccination certificates revealed that only two-thirds of the patients had been vaccinated against tetanus and diphtheria in the preceding 10 years; this is the STIKO's minimal recommendation for all persons living in Germany *(Table 4)*. Only 56 patients (33%) had received the seasonal influenza vaccine in 2008. The patients' status with respect to all vaccinations recommended by the STIKO is shown in *Table 5*.

A subgroup analysis was performed to compare the vaccination status of patients taking TNF-blockers to that of patients who had never been treated with a "classic" immune suppressant. No significant difference was found *(Table 6)*.

TABLE 3

Reasons given by patients for avoiding vaccination (some patients gave more than one reason)

I avoid vaccinations because. . .	Agree	
	Number	%
I am afraid my bowel disease could get worse	18	8.9
my immune system is not intact	31	15.3
I am afraid of general side effects	45	22.2
vaccinations definitely won't work because of the medications I am taking	7	3.4
I oppose vaccinations in general	0	0
my family is against vaccinations	0	0
my GP advised me to avoid them	11	5.4
my gastroenterologist advised me to avoid them	6	3.0
vaccinations hurt	4	2.0
they require more trips to the doctor	4	2.0

TABLE 4

Documentation of baseline immunization against tetanus, diphtheria, and pertussis in the overall patient cohort

	Vaccination within 10 years		3 or more vaccinations	
	Number	%	Number	%
Tetanus	136	67.0	159	78.3
Diphtheria	134	66.0	157	77.3
Pertussis	42	20.7	103	50.7

Univariate analysis revealed no significant differences regarding vaccination status between patients in the 1st and 4th age quartiles, or regarding the duration of IBD or the total population of the patient's birthplace or educational level (below 10th grade vs. high school graduate). In the absence of such differences, no multivariate analysis was performed.

Discussion

The vaccination status of this group of patients with chronic inflammatory bowel disease was markedly inferior to the standard set by the STIKO recommendations. Only two-thirds of the participants complied with the disease-independent recommendations to boost their tetanus and diphtheria immunizations every 10 years. Two-thirds or more of them were not adequately immunized against diseases that can be especially severe in patients with IBD and that are preventable by vaccination (hepatitis B, influenza, and diseases caused by the varicella-zoster virus, pneumococci, and human papilloma viruses).

TABLE 5

Documentation of vaccinations generally recommended by the STIKO, travel vaccinations, and vaccinations for medical indications in the overall patient cohort (no patient was vaccinated against *Haemophilus influenzae*)

	Vaccination: no/never		Vaccination: yes/once		Vaccination: twice		Vaccination: 3 or more times	
	Number	%	Number	%	Number	%	Number	%
Influenza 2008	112	66.7	56	33.3	–	–	–	–
Hepatitis A	112	66.7	7	4.2	10	6.0	39	23.2
Hepatitis B	106	63.1	1	0.6	3	1.8	58	34.5
Measles	76	45.2	20	11.9	47	28.0	25	14.9
Mumps	129	76.8	20	11.9	15	8.9	4	2.4
Rubella	111	66.1	28	16.7	23	13.7	6	3.6
Varicella	166	98.8	2	1.2	–	–	–	–
Meningococci	165	98.2	3	1.8	–	–	–	–
Pneumococci	150	89.3	12	7.1	6	3.6	–	–
Poliomyelitis	11	6.5	6	3.6	9	5.4	142	84.5
TBE	123	73.2	4	2.4	12	7.1	29	17.3
HPV(111 women)	110	99.1	1	0.9	–	–	–	–

In a similar study in Los Angeles, 169 IBD patients were asked whether they had been vaccinated against tetanus in the past 10 years, and only 45% answered "yes." This percentage is even lower than the figure of 67% obtained in the present study. On the other hand, the Los Angeles patients were vaccinated against seasonal influenza at about the same rate as our patients (28% vs. 33%), and the same was true of antipneumococcal vaccination (9% vs. 11 %). In the Los Angeles study, too, 18% of patients gave the fear of side effects as a major reason for not being vaccinated—a figure comparable with the 22% seen in our study (14). In other studies, the same fear was found to be patients' major reason not to be vaccinated against other types of disease as well (15, 16).

The problem of inadequate vaccination of immunosuppressed patients has been found in other patient groups (17–19): in one study, for example, among 46 children who had undergone renal transplantation, only 2 (4%) were fully vaccinated in accordance with the relevant disease-specific recommendations (19).

A study of the vaccination status of 715 patients with juvenile idiopathic arthritis (JIA) revealed lower rates of vaccination against tetanus and diphtheria in patients aged 7 to 11 than in healthy control children; the discrepancy was even more marked among patients aged 12 to 17. No overall statistical link was found between pharmacotherapy and the vaccination rate , but a significant correlation was found between the intensity of pharmacotherapy among the JIA patients and their non-receipt of the MMR vaccine. Every third JIA patient was inadequately immunized: the main reason was that a doctor had advised against vaccination (79%), while the parents' refusal to vaccinate was merely a secondary reason (10%) (20).

In the present study, however, we found no difference in the rates of vaccination with the non-live tetanus/diphtheria vaccine and the live MMR vaccine *(Tables 4 and 5)*. One obvious reason for this is that the STIKO recommends MMR vaccination in early childhood, and most of the study participants had not yet developed IBD at that age. The patients were in markedly worse compliance with the vaccination recommendations that apply only to patients receiving immunosuppressive treatment—specifically, vaccination against varicella, meningococci, and pneumococci *(Table 5)*. Among the adults involved in the present study, unlike the children in the study mentioned above (20), no patient expressed a general aversion to vaccination, and only 8.4% had avoided vaccination on the advice of a physician. Our data, however, might not be representative of Germany as a whole: more than 90% of our patients grew up in the former East Germany, and vaccination rates in the former West Germany generally tend to be lower than in the East (20, 21).

One limitation of this study is that we could not compare our patients' vaccination rates with those of the healthy general population. A representative study of a healthy control group with respect to all generally recommended vaccinations would not have been feasible, because such people rarely, if ever, consult a physician. Data on the vaccination status of children are collected at the start of each school year and are published annually by the Robert Koch Institute (RKI), but comparable data on adolescents and adults are lacking (22, 23). As part of its nationwide health monitoring project, the RKI is currently collecting data on the vaccination status of adults via telephone survey (Telephone Health Survey, GEDA; German Adult Health Study [*Studie zur Gesundheit Erwachsener in Deutschland*], DEGS), but the findings have not yet been published and are thus not available for comparison with our data. One can obtain further information on the content and methods of these studies on the Robert Koch Institute's website, http://www.rki.de (select "English" at top right, then proceed to the link "Health Reporting" and to the subsequent link "Health Surveys").

Another limitation of this study is that some patients could not produce any documentation of their vaccination status. We considered this the equivalent of non-vaccination, and thus our reported findings may be worse than is actually the case. Our procedure does, however, correspond to the STIKO recommendations themselves (24). Yet another possible limitation of the patient cohort in the present study derives from our primary exclusion of all patients who had been counseled by a physician about vaccinations within the past year. Our aim was to avoid any additional bias due to variable patient education. Use of this exclusion criterion might, however, have made the findings worse than they would have been in a non-preselected patient group, because patients receiving good medical care were preferentially excluded *a priori*.

It seems out of keeping with the mostly inadequate vaccination status of the patients in our study that more than half of them expressed no reservations whatsoever

TABLE 6

Vaccination status of patients treated with TNF-blockers,compared to that of patients who were never treated with a "classic" immunosuppressant. The chi-squared and Fisher exact tests were used to compute p-values.

	TNF-blockers (39 pts.)		Never immuno-suppressed (67 pts.)		p
	Number	%	Number	%	
Tetanus < 10 years	23	59.0	47	70.1	0.24
Diphtheria < 10 years	22	56.4	47	70.1	0.15
Pertussis < 10 Jahre	6	15.4	14	20.9	0.48
Hepatitis B	14	35.9	21	31.3	0.63
Measles, 1 x	4	10.3	3	4.5	0.23
Measles, > 1 x	15	38.5	26	38.8	0.97
Rubella, 1 x	7	17.9	10	14.9	0.68
Rubella, > 1 x	4	10.3	12	17.9	0.29
Mumps, 1 x	4	10.3	8	11.9	0.79
Mumps, > 1 x	2	5.1	7	10.4	0.19
Influenza 2008	8	20.5	17	25.4	0.57
Pneumococci	0	0	0	0	–
Prednisolone (ever)	37	94.9	44	65.7	< 0.0001

about vaccinations, and that more than 80% said they were willing to have all of the recommended vaccinations. This discrepancy may well have been due to inadequate knowledge among the patients themselves and among their physicians, not just of the generally recommended vaccinations, but also of the vaccinations that are specifically recommended for patients with IBD. This apparent effect of physicians' faulty knowledge on the implementation of recommendations to vaccinate is parallelled in the findings of a recently published rheumatological study. The Vaccination Committee of the German Society for Pediatric and Adolescent Rheumatology *(Deutsche Gesellschaft für Kinder- und Jugendrheumatologie)* surveyed its members with respect to vaccination practices and found major differences of attitude toward the use of live vaccines: for example, half of the rheumatologists surveyed said that MMR vaccination was permissible in patients receiving methotrexate, and half said that it was not. Lesser differences were found with respect to the use of non-live vaccines: most (58-100%) of the rheumatologists were willing to give the recommended vaccinations of this type to patients receiving a variety of drug combinations (21).

Most patients named their family physician or general practitioner as the most important person to whom they would turn to check their vaccination status. Fewer than 10% of them asked their gastroenterologist for help in checking their vaccination status. Nevertheless, in our opinion, the primary prescriber of immunosuppressive drugs bears the responsibility to check that the patient has actually received all of the vaccinations that are recommended when such drugs are given.

We think the findings of this study indicate deficiencies in the medical care of the patients whom we surveyed. We have, therefore, worked with the President of the Vaccination Committee for the State of Saxony (*Sächsische Impfkommission,* SIKO) to produce a quality management instrument that incorporates the IBD-related recommendations of both the STIKO and the SIKO. The SIKO recommendations are the most suitable ones for implementation in the region where we practice *(Table 1)*. Updated recommendations of the STIKO can be found at http://www.rki.de, and the SIKO recommendations can be found at http://www.lua.sachsen.de. In rare cases, as when a patient lives in Saxony but is insured in a different German state, the differences between these two sets of recommendations may create difficulties in their reimbursable implementation; we recommend discussing any such problems directly with the local health department, or with the insurance carrier.

Drawing a further conclusion from the findings of this study, we recommend the serologic measurement of antibody titers against measles, mumps, rubella, varicella, and hepatitis B, as well as a tuberculosis test, for all patients with IBD, often as early as the initial consultation. This is reasonable, as it provides a means of detecting any potential need for immunization with a live vaccine (e.g., against measles, mumps, rubella, or varicella) before immunosuppressive treatment becomes necessary.

KEY MESSAGES

- The vaccination status of patients whith chronic inflammatory bowel disease diverges markedly from the official recommendations.
- The vaccination status of intensively immunosuppressed patients did not differ from that of patients who were not taking immunosuppressive medication.
- The patients nonetheless expressed their willingness to receive all of the recommended vaccinations.
- The most commonly expressed reservation about vaccination was the fear of side effects.
- These results show that physicians need to be more aware of the potentially deficient vaccination status of their patients with inflammatory bowel disease (and perhaps other chronic inflammatory diseases as well) who are taking immunosuppressive medication.

A number of opportunistic infections that are more common in immunocompromised patients cannot be prevented by vaccination: these include infection with *Clostridium difficile,* cytomegalovirus, and Epstein-Barr virus as well as tuberculosis, histoplasmosis, and *Pneumocystis jirovecii* pneumonia. Patients taking multiple immunosuppressive drugs should be given trimethoprim and sulfamethoxazole as prophylaxis against *Pneumocystis* pneumonia (7). The consensus until recently was that this form of prophylaxis should only be provided when three different immunosuppressive drugs are given simultaneously, but the new ulcerative colitis guidelines contain a recommendation for it when two immunosuppressive drugs are given. Patients must also be educated about further, non-pharmacological preventive measures, including proper hand-washing and food preparation. Highly practical advice on the last point can be found in a current publication of the Robert Koch Institute's Committee on Hospital Hygiene and Infectious Disease Prevention (25).

In summary, the findings of this study allow us to conclude that

- the vaccination status of the patients included in this study was inadequate,
- there was a marked discrepancy between the patients' expressed willingness to be vaccinated and their actual vaccination status, and
- the most common reason patients gave for not being vaccinated was the fear of side effects.
- Above all, our findings imply that physicians need to be more aware of the potentially deficient vaccination status among their patients who are taking immunosuppressive drugs.

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Sehr geehrte Patientin, sehr geehrter Patient,

es gibt Hinweise darauf, dass Patienten mit chronisch-entzündlichen Darmerkrankungen Impflücken aufweisen. Wir wollen in einem regionalen Gemeinschaftsprojekt den Impfstatus unserer Patienten sowie die Ursachen von möglichen Impflücken untersuchen.

Wir bitten Sie deshalb heute, unsere wissenschaftlichen Bemühungen zu unterstützen. Bitte füllen Sie diesen **Fragebogen** aus und bringen ihn (gerne auch im verschlossenen Umschlag) **zur nächsten Sprechstunde** mit. Die Fragen sind keine Wissensfragen mit richtigen und falschen Antworten sondern sollen einen Querschnitt des Meinungsspektrums unserer Patienten ergeben. Bitte bringen Sie zusätzlich - falls vorhanden - Ihren **Impfausweis** oder andere Impfnachweise mit. Wir würden diese anonymisiert kopieren und Ihnen sofort wiedergeben. Wenn Sie keinen Impfausweis haben, bringen Sie bitte trotzdem diesen Fragebogen mit.

Die erhobenen Daten werden zentral **anonym** ausgewertet. Für Sie ergeben sich keinerlei Verpflichtungen aus der Studienteilnahme. Diese Studie dient ausschließlich wissenschaftlichen Zwecken und wird nicht finanziell unterstützt oder kommerziell verwertet.

Haben Sie einen Impfausweis? □ Ja □ nein

Wann wurden Sie das letzte Mal auf Ihren Impfausweis angesprochen (die heutige Umfrage ausgenommen)

ca. Monat: _____ca. Jahr: _____ □ noch nie

Ich lasse meinen Impfstand überprüfen (bitte ankreuzen)

□ durch den Hausarzt
□ durch den Gastroenterologen
□ durch _____
□ mache ich selber
□ nie bzw. kann mich nicht mehr daran erinnern

Ich denke, dass ich einen vollständigen Impfstatus habe:

□ ja □ nein □ weiß nicht

Ist Ihnen bekannt, dass es staatliche Empfehlungen für Schutzimpfungen gibt?

□ ja □ nein

Ich wäre bereit, alle offiziell empfohlenen Schutzimpfungen durchführen zu lassen:

□ ja □ nein □ _____

Bitte kreuzen Sie alle aus Ihrer Sicht zutreffenden Argumente gegen Schutzimpfungen an
Ich vermeide Schutzimpfungen,

□ weil ich befürchte, dass die Darmerkrankung schlimmer wird
□ weil mein Immunsystem nicht intakt ist
□ weil ich allgemeine Nebenwirkungen befürchte
□ weil die Impfung aufgrund meiner Medikamente wahrscheinlich sowieso nicht wirkt
□ weil ich generell gegen Impfungen bin
□ weil meine Angehörigen dagegen sind
□ weil mir mein Hausarzt abgeraten hat
□ weil mir mein Gastroenterologe abgeraten hat
□ weil sie schmerzhaft sind
□ weil sie zu zusätzlichen Arztterminen führen

□ anderes Argument:_____
□ Ich stimme keinem der genannten Argumente zu.

Haben Sie □ Morbus Crohn oder □ Colitis ulcerosa?

Wann wurde diese Erkrankung diagnostiziert? _____

Mussten Sie deshalb schon einmal operiert werden? □ Ja □ nein

Wie ist Ihr Alter? _____ Jahre □ weiblich □ männlich

Nahmen Sie schon folgende Medikamente ein (bitte ankreuzen) ?

	Jetzt aktuell	**Früher**	**Nie**	**Weiß nicht**
Prednisolon				
Budesonid*				
Azathioprin*				
6-Mercaptopurin, 6-Thioguanin*				
Ciclosporin*				
Metotrexat*				
TNF-Blocker				
Mesalazin*				
E.coli nissle*				

*in Klammern wurden hier alle verfügbaren Handelsnamen aufgeführt

Mussten Sie schon einmal mehr als **20 mg Prednisolon** täglich einnehmen?
□ ja □ nein □ weiß nicht

Lassen Sie sich gegen Grippe impfen?

□ jedes Jahr □ gelegentlich □ nie

Haben Sie schon einen Arzt wegen **Reiseimpfungen** konsultiert? □ ja □ nein

Wie groß war der Ort, in dem Sie vorwiegend Ihre **ersten 10 Lebensjahre** verbrachten?

□ < 2000 Einwohner
□ > 2000 – 25.000 Einwohner (zum Vergleich: Borna hat 20.000 Einwohner)
□ > 25.000 – 250.000 Einwohner (zum Vergleich: Halle hat 200.000 Einwohner)
□ > 250.000 Einwohner

In welchem Bundesland lag dieser?
□ Sachsen
□ _____

Wie groß war der Ort, in dem Sie gegenwärtig leben (**Hauptwohnsitz**)?

□ < 2000 Einwohner
□ > 2000 – 25.000 Einwohner (zum Vergleich: Borna hat 20.000 Einwohner)
□ > 25.000 – 250.000 Einwohner (zum Vergleich: Halle hat 200.000 Einwohner)
□ > 250.000 Einwohner

In welchem Bundesland wohnen Sie?
□ Sachsen
□ _____

Ihr Schulabschluss?
□ < 10. Klasse
□ 10. Klasse
□ (Fach-) Abitur

Herzlichen Dank für Ihre Teilnahme an dieser Befragung!